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EXAMINER	
GREENE, JASON M	

ART UNIT	PAPER NUMBER
1724	8

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Please find below and/or attached an Office communication concerning this application or proceeding.

7C-8

Office Action Summary	Application No.	Applicant(s)	
	09/871,575	GOGINS ET AL.	
	Examiner	Art Unit	
	Jason M. Greene	1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-56 is/are rejected.

7)☒ Claim(s) 1,3,4,7-44 and 49 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 31 May 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5,6,7 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because pages 53-55 of the Specification have been written on in landscape orientation rather than in portrait orientation. See 37 CFR 1.52(a)(iii). Appropriate correction is required.

Claim Objections

2. Claims 7-44 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 7-44 are all indirectly dependent on claim 1, However, while claim 1 is directed toward an air filter, claims 7-44 are directed toward "The composition", "The polymer", or "The polymeric composition" of a previous claim. Therefore, it is not clear whether or not the claims include all of the limitations of the previous claims from which they depend. For examination purposes, all of the claims were assumed to include all of the limitations of the claims from which they depend.

3. Claim 1 is objected to because of the following informalities: The phrase "(d)" in line 18 should be changed to read as "(c)". Appropriate correction is required.

4. Claims 3 and 4 are objected to because of the following informalities: A period should be inserted at the end of line 2 of the claims. Appropriate correction is required.

5. Claims 13 and 14 are objected to because of the following informalities: The word "is" should be inserted between the words "additive" and "miscible" in line 4 of the claims. Appropriate correction is required.

6. Claim 49 is objected to because of the following informalities: The word "and" should be inserted at the end of line 16. Appropriate correction is required.

7. Claim 50 is objected to because of the following informalities: The second or third occurrence of the word "the" in line 4 should be deleted. Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 20, 21, 25, 33, 34, 36, 54, and 55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 20 and 21 recite the limitation "the nylon copolymer" in line 1. There is insufficient antecedent basis for this limitation in the claims.

Claim 25 recites the limitation "the lower melting point of the polymers" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

With regard to claims 33 and 34, it is unclear whether the additive is intended to be a single compound comprising a fluorocarbon or nonionic surfactant having the resinous properties recited in claim 14 or whether the additive is intended to be a blend of the resinous additive recited in claim 14 and a separate fluorocarbon or nonionic surfactant. For examination purposes the Examiner has assumed the additive to be a blend of the resinous additive recited in claim 14 and a separate fluorocarbon or nonionic surfactant. If this assumption is correct, the Examiner suggests Applicants' insert the phrase "a blend of the resinous additive and" between the words "comprises" and "a" in line 1 of the claims.

Claim 36 recites the limitation "the condensation polymer" in line 1. There is insufficient antecedent basis for this limitation in the claim. It appears as though claim

36 should depend from claim 14. For examination purposes, claim 36 was assumed to depend from claim 14.

Claim 54 recites the limitation "the filter construction inner clear air chambers" in line 2. There is insufficient antecedent basis for this limitation in the claim. While claim 50, from which claim 54 depends, provides proper antecedent basis for a single filter construction clean air chamber, claim 50 does not provide proper antecedent basis for the plural filter construction clean air chambers recited in claim 54. Because of the improper antecedent basis, it is unclear whether claim 50 is intended to have a single filter construction clean air chamber or a plurality of filter construction clean air chambers.

Claim 55 recites the limitation "the filter construction inner clear air chambers" in line 2. There is insufficient antecedent basis for this limitation in the claim. While claim 51, from which claim 55 depends, provides proper antecedent basis for a single filter construction clean air chamber, claim 51 does not provide proper antecedent basis for the plural filter construction clean air chambers recited in claim 55. Because of the improper antecedent basis, it is unclear whether claim 51 is intended to have a single filter construction clean air chamber or a plurality of filter construction clean air chambers.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-6, 8, and 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether in view of Kahlbaugh et al. '399.

With regard to claim 1, Raether discloses an air filter assembly comprising a housing (10) including an air inlet (11), an air outlet (12), a spacer wall (28) separating said housing into a filtering chamber (22) and a clean air chamber (60), said spacer wall including a first air flow aperture therein, a first filter construction (32) positioned in air flow communication with said first air flow aperture in said spacer wall, said first filter construction including an extension of a pleated filter media composite defining a filter construction inner clean air chamber, said first filter construction being oriented with said filter inner clean air chamber in air flow communication with said spacer wall first air flow aperture, and a pulse-jet cleaning system (65,70) oriented to direct a pulse of air into said filter construction inner clean air chamber in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 18.

Raether does not disclose the pleated filter media composite including a substrate at least partially covered by a layer of fine fiber, said fiber comprising a

diameter of about 0.01 to 0.5 microns that after exposure for a test period of 16 hours to test conditions of 140 ^{0}F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes.

Kahlbaugh et al. '399 discloses a similar filter assembly having a filter media comprising a pleated filter media composite including a substrate (31) at least partially covered by a layer of fine fiber (32), said fiber comprising a diameter of 0.1 microns in Figs. 8-11, col. 14, line 35 to col. 17, line 28, and col. 25, line 5 to col. 27, line 32.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the filter media of Kahlbaugh et al. '399 into the air filter assembly of Raether to provide an improved filter media having a longer lifetime at a given efficiency and flow rate, as suggested by Kahlbaugh et al. '399 in col. 1, line 3 to col. 3, line 35 and col. 9, line 15 to col. 11, line 28.

Since the prior art is seen as disclosing a specific example lying within the claimed range of the fine fiber comprising a diameter of about 0.01 to 0.5 microns, this limitation is anticipated.

With regard to the thermal and humidity resistance of the fine fibers, both Applicants and Kahlbaugh et al '399 disclose forming the fine fiber layer of the same materials. Specifically, Applicants teach forming the fine fiber layer from polyolefin, polyvinyl chloride (PVC), cellulose ester, polyacrylonitrile, polyamides, polystyrene, polysulfones, polyvinylidene fluoride, polyvinylidene chloride, or nylon in page 12, line 13 to page 13, line 27. Kahlbaugh et al. '399 teaches forming the fine fibers from identical materials in page 16, lines 53-64. Since Applicants and Kahlbaugh et al '399

both teach the fine fiber layer being formed from the same material, the fine fibers of Kahlbaugh et al. '399 would inherently have the same heat and humidity resistance properties as the fine fibers of the present invention.

With regard to claims 2 and 3, Kahlbaugh et al. '399 discloses the fine fiber comprising the condensation polymers nylon and cellulose ether in col. 16, lines 53-64.

With regard to claims 2, 4, 5, 6, and 8, Kahlbaugh et al. discloses the fine fiber comprising the addition polymers polyvinyl chloride and polyvinylidene fluoride in col. 16, lines 53-64.

With regard to claim 45, Raether discloses the air filter assembly further including a first Venturi element (70) mounted in said spacer wall first air flow aperture and positioned to project into said first filter construction inner clean air chamber, and wherein said pulse cleaning system includes a first blowpipe (65) oriented to direct a pulse of air into said first Venturi element from said clean air chamber and toward said first filter construction in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 52.

With regard to claim 46, Raether discloses the first filter construction including a first end cap (82) having a central aperture, said extension of filter media being embedded within the first end cap in Fig. 7 and col. 4, line 62 to col. 5, line 4.

With regard to claim 47, Raether discloses the first filter construction including first and second filter elements (32) in axial alignment, said extension of pleated filter media composite comprising a first extension of media in said first filter element and a second extension of media in said second filter element in Fig. 2 and col. 5, lines 16-18.

With regard to claims 48 and 49, Raether discloses the spacer wall (28) including a second air flow aperture therein, and the assembly further including a second filter construction positioned in air flow communication with the second air flow aperture in said spacer wall, said second filter construction including an extension of a pleated filter media composite defining a second filter construction inner clean air chamber, said second filter construction being oriented with said second filter inner clear air chamber in air flow communication with said spacer wall second air flow aperture, a second Venturi element (70) mounted in said spacer wall second air flow aperture and positioned to project into said second filter construction inner clean air chamber, a second blow pipe (65) oriented to direct a pulse of air into said second Venturi element from said clean air chamber and toward said second filter construction in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 18.

Raether does not disclose the pleated filter media composite of said second filter construction including a substrate at least partially covered by a layer of fine fiber.

Kahlbaugh et al. '399 discloses a similar filter assembly having a filter media comprising a pleated filter media composite including a substrate (31) at least partially

covered by a layer of fine fiber (32), said fiber comprising a diameter of 0.1 microns in Figs. 8-11, col. 14, line 35 to col. 17, line 28, and col. 25, line 5 to col. 27, line 32.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the filter media of Kahlbaugh et al. '399 into the air filter construction of Raether to provide an improved filter media having a longer lifetime at a given efficiency and flow rate, as suggested by Kahlbaugh et al. '399 in col. 1, line 3 to col. 3, line 35 and col. 9, line 15 to col. 11, line 28.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether and Kahlbaugh et al. '399 as applied to claim 6 above, and further in view of Barris et al.

Raether and Kahlbaugh et al. '399 do not disclose the fine fiber comprising polyvinylidene chloride.

Barris et al. discloses a similar filter media having a layer of fine fiber (14) supported on a substrate (12) wherein the fine fiber comprises polyvinylidene chloride in Fig. 1, col. 3, lines 28-36, and col. 5, lines 4-8.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the polyvinylidene chloride fine fibers of Barris et al. into the filter media of Raether and Kahlbaugh et al. '399 in that such is merely an alternate material in the art for forming a layer of fine fibers, mere substitution of one known fine fiber forming material for another in the art without a showing of unobvious or unexpected results being within the scope of one having ordinary skill in the art.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether and Kahlbaugh et al. '399 as applied to claim 4 above, and further in view of Emig et al.

Raether and Kahlbaugh et al. '399 do not disclose the fine fiber comprising polyvinyl alcohol.

Emig et al. discloses a similar filter media having a layer of fine fiber supported on a substrate wherein the fine fiber comprises polyvinyl alcohol in col. 2, lines 26-53.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the polyvinyl alcohol fine fibers of Emig et al. into the filter media of Raether and Kahlbaugh et al. '399 in that such is merely an alternate material in the art for forming a layer of fine fibers, mere substitution of one known fine fiber forming material for another in the art without a showing of unobvious or unexpected results being within the scope of one having ordinary skill in the art.

12. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Emig et al. as applied to claim 9 above, and further in view of European Patent Application EP 0 351 046.

With regard to claim 10, Raether, Kahlbaugh et al. '399, and Emig et al. do not disclose the polyvinyl alcohol being crosslinked with about 1 to 40 weight percent of a crosslinking agent.

EP 0 351 046 discloses crosslinking polyvinyl alcohol with 20 weight percent of a polyacrylic acid in page 2, line 42 to page 3, line 7 and page 6, lines 26-51.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the crosslinking of EP 0 351 046 into the fine fiber of Raether, Kahlbaugh et al. '399, and Emig et al. to provide a polyvinyl alcohol fine fiber having improved hot water resistance, as suggested by EP 0 351 046 in page 2, line 10 to page 3, line 5.

With regard to claim 11, EP 0 351 046 teaches using polyacrylic acid having any desired molecular weight in page 2, line 54.

Since the prior art range is seen as overlapping the claimed range of a molecular weight between about 1000 and 3000, a prima facie case of obviousness exists which must be overcome through a showing of unexpected or unobvious results.

Furthermore, EP 0 351 046 explicitly teaches the polyacrylic acid having a degree of polymerization of 200 in page 2, lines 54-55. Since acrylic acid has the formula $CH_2CHCOOH$, the molecular weight of the acrylic acid monomer can be calculated to be 72 and the molecular weight of a polyacrylic acid having a degree of polymerization of 200 can be calculated to be 72*200=14,400. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a polyacrylic acid having a molecular weight of about 3000 since a polyacrylic acid having a molecular weight of about 3000 would be expected to exhibit properties similar to a polyacrylic acid having a molecular weight of 14,400.

13. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, Emig et al., and European Patent Application EP 0 351 046 as applied to claim 10 above, and further in view of Elmasry.

EP 0 351 046 discloses crosslinking polyvinyl alcohol with 20 weight percent of a crosslinking agent in page 2, line 42 to page 3, line 7 and page 6, lines 26-51.

Raether, Kahlbaugh et al. '399, Emig et al., and EP 0 351 046 do not disclose the polyvinylalcohol being crosslinked using a melamine-formaldehyde resin having a molecular weight of about 1000 to 3000.

Elmasry teaches using melamine-formaldehyde to crosslink polyvinylalcohol in col. 1, lines 36-39.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the melamine-formaldehyde crosslinking agent of Elmasry into the polyvinylalcohol of Raether, Kahlbaugh et al. '399, Emig et al., and EP 0 351 046 in that such is an alternate crosslinking agent in the art for crosslinking polyvinylalcohol, mere substitution of one known crosslinking agent for another in the art without a showing of unobvious or unexpected results being within the scope of one having ordinary skill in the art.

EP 0 351 046 teaches the crosslinking agent having any desired molecular weight in page 2, line 54.

Since the prior art range is seen as overlapping the claimed range of a molecular weight between about 1000 and 3000, a prima facie case of obviousness exists which must be overcome through a showing of unexpected or unobvious results.

14. Claims 13, 14, 26-31, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether and Kahlbaugh et al. '399 as applied to claim 3 above, and further in view of Gallucci '474.

With regard to claims 13 and 14, Kahlbaugh et al. '399 discloses the polymer comprising nylons, aromatic nylons, or copolymers of nylons and aromatic nylons in col. 18, lines 48-64. Since Kahlbaugh et al. '399 teaches using nylons, aromatic nylons, or copolymers of nylons and aromatic nylons, Kahlbaugh et al. '399 is seen as teaching the polymer comprising a condensation polymer other than a copolymer formed from a cyclic lactam and a C_{6-10} diamine monomer or a C_{6-10} diacid monomer.

Raether and Kahlbaugh et al. '399 do not disclose the condensation polymer including a resinous additive comprising an oligomer having a molecular weight of about 500 to 3000 and an alkyl phenolic aromatic character wherein the additive is miscible in the condensation polymer.

Gallucci '474 discloses forming fibers from a polymer comprising nylon and a resinous additive comprising an oligomer having a molecular weight of about 400 to 30000 and an alkyl phenolic aromatic character wherein the additive is miscible in the condensation polymer in col. 1, line 18 to col. 5, line 19.

Since the prior art range is seen as overlapping the claimed range of the molecular weight being about 500 to 3000, a prima facie case of obviousness exists which must be overcome through a showing of unobvious or unexpected results.

With regard to claims 26 and 27, Gallucci '474 teaches the additive comprising an oligomer comprising tertiary butyl phenol and having the claimed structure in col. 1, line 49 to col. 5, line 10. Gallucci '474 is seen as disclosing the claimed structure when R is a tertiary butyl group, R' is a direct carbon to carbon bond, and s equals 1.

With regard to claims 28 and 29, Gallucci '474 teaches the additive comprising an oligomer comprising bis-phenol A and having the claimed structure in col. 1, line 49 to col. 5, line 10 and col. 7, lines 28-35. Gallucci '474 is seen as disclosing the claimed structure when R is a alkyl hydroxy aryl group, R' is a direct carbon to carbon bond, and s equals 1.

With regard to claims 30 and 31, Gallucci '474 teaches the additive comprising an oligomer comprising dihydroxy biphenyl and having the claimed structure in col. 1, line 49 to col. 5, line 10. Gallucci '474 is seen as disclosing the claimed structure when R is a hydroxy aryl group, R' is a direct carbon to carbon bond, and s equals 1.

With regard to claim 39, Kahlbaugh et al. '399 discloses the condensation polymer comprising an aromatic polyamide in col. 16, lines 56-64.

15. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Barris et al. and Suhonen et al.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not disclose the polymer being a component of a solution, the solution comprising a major proportion of an aqueous alcoholic solvent and about 3 to 30 weight percent of the polymeric composition.

Barris et al. discloses forming a fine fibers from polyvinylidene chloride wherein the polymer is a component of a solution, the solution comprising a major proportion of methyl ethyl ketone solvent and 7 weight percent of the polymeric composition in col. 7, line 30 to col. 8, line 30.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the polymeric solution of Barris et al. into the air filter of Raether, Kahlbaugh et al. '399, and Gallucci '474 to allow the fine fibers to be formed by electrostatic spinning, as suggested by Barris in col. 6, lines 8-64.

Barris et al. does not disclose the solvent being an aqueous alcoholic solvent.

Suhonen et al. discloses using an aqueous alcoholic solvent to dissolve nylon in col. 3, lines 23-30.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the aqueous alcoholic solvent of Suhonen et al. into the air filter of Raether, Kahlbaugh et al. '399, Gallucci '474, and Barris to allow the fine fibers to be formed of nylon.

16. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Emig et al. and Baumann et al.

Raether and Kahlbaugh et al. '399 do not disclose the polymer comprising a polyalkylene terephthalate.

Gallucci '474 teaches adding the alkyl phenolic aromatic resin additive to copolymers of polyamides (nylons) and polyesters in col. 5, lines 20-36.

Emig et al. teaches forming microfibers from copolymers of polyamides and polyesters in col. 2, lines 59-65.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the copolymer of polyamide and polyester of Emig et al. for the polymers of Raether, Kahlbaugh et al. '399, and Gallucci '474 in that such are alternate polymers in the art for forming fine fibers, mere substitution of one known fine fiber forming polymer for another in the art being within the scope of one having ordinary skill in the art.

Raether, Kahlbaugh et al. '399, Gallucci '474, and Emig et al. do not disclose the polyester being a polyalkylene terephthalate.

Baumann et al. teaches polyethylene terephthalate being a well known polyester used in the formation of fine fibers in col. 5, lines 45-67.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the polyethylene terephthalate of Baumann et al. for

the polyesters of Raether, Kahlbaugh et al. '399, Gallucci '474, and Emig et al. in that such are alternate polyesters in the art for forming fine fibers, mere substitution of one known fine fiber forming polyester for another in the art being within the scope of one having ordinary skill in the art.

17. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, Gallucci '474, Emig et al. and Baumann et al., as applied to claim 16 above, and further in view of Asano et al.

Raether, Kahlbaugh et al. '399, Gallucci '474, Emig et al. and Baumann et al. do not disclose the polymer comprising polyalkylene naphthalate.

Asano et al. teaches it being well known to form fibers from polyalkylene naphthalate in col. 1, lines 42-45.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the polyalkylene naphthalate of Asano et al. into the fibers of Raether, Kahlbaugh et al. '399, Gallucci '474, Emig et al. and Baumann et al. to improve the durability of the fiber, as suggested by Asano et al. in col. 1, lines 42-45.

18. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Baumann et al.

Kahlbaugh et al. '399 discloses the polymer being nylon in col. 16, lines 48-64.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not explicitly disclose the nylon polymer comprising a homopolymer having repeating units derived from a cyclic lactam.

Baumann et al. teaches forming fine fibers from a nylon polymer, wherein the polymer comprising a homopolymer (nylon 6) having repeating units derived from a cyclic lactam in col. 5, lines 45-67.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the nylon 6 of Baumann et al. for the nylons of Raether, Kahlbaugh et al. '399, and Gallucci '474 in that such are alternate nylons in the art for forming fine fibers, mere substitution of one known fine fiber forming nylon for another in the art being within the scope of one having ordinary skill in the art.

19. Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Okamoto et al. '352.

With regard to claims 20-22, Kahlbaugh et al. '399 discloses the polymer being nylon, aromatic nylon, or a copolymer of nylon and aromatic nylon in col. 16, lines 48-64.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not explicitly disclose the nylon polymer being a copolymer combined with a second nylon polymer, the second nylon polymer differing in molecular weight or monomer composition, the second nylon

polymer comprising an alkoxy alkyl modified polyamide, or the second nylon polymer comprising a nylon copolymer.

Okamoto et al. '352 discloses forming fibers from copolymers of nylon 6, nylon 7, nylon 8, nylon 9, nylon 11, and nylon 12 in col. 3, lines 58-67. Therefore, Okamoto et al. is seen as teaching forming fibers from a copolymer of nylon 6 and nylon 7, wherein the copolymer is combined with a second nylon copolymer comprising an alkoxy alkyl modified polyamide (nylon 8) and nylon 9.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the nylon copolymers of Okamoto et al. '352 for the nylons of Raether, Kahlbaugh et al. '399, and Gallucci '474 in that such are alternate nylons in the art for forming fibers, mere substitution of one known fiber forming nylon for another in the art being within the scope of one having ordinary skill in the art.

With regard to claim 23, Okamoto et al. '352 teaches the nylons being combined to form a copolymer in col. 3, lines 58-67.

Raether, Kahlbaugh et al. '399, Gallucci '474, and Okamoto et al. '352 do not explicitly disclose the polymers being treated to from a single polymeric composition as measured by a differential scanning calorimeter showing a single phase material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to ensure that the different polymers were sufficiently well mixed to form a single phase continuous copolymer material to ensure that the formed fibers exhibited the desired properties across the entire length and cross-section of the fibers.

20. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, Gallucci '474, and Okamoto et al. '352 as applied to claim 23 above, and further in view of Ueda et al. '055

With regard to claim 24, Raether, Kahlbaugh et al. '399, Gallucci '474, and Okamoto et al. '352 do not disclose the copolymer and the second polymer being heat treated.

Ueda et al. '055 discloses heat treating nylon fibers in col. 1, lines 23-26.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the heat treatment of Ueda et al. '055 into the fibers of Raether, Kahlbaugh et al. '399, Gallucci '474, and Okamoto et al. '352 to stabilize the fibers against heat and stress, as suggested by Ueda et al. in col. 1, lines 23-26.

With regard to claim 25, Ueda et al. discloses heat treating the nylon to a temperature (180 ^{0}C) less than the lower melting point of the polymers in col. 2, lines 37-51.

21. Claims 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Jariwala et al.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not disclose the additive comprising a blend of the resinous additive and a fluoropolymer.

Jariwala et al. discloses adding a nonionic fluorocarbon surfactant to a polymeric fiber in col. 1, line 4 to col. 4, line 64 and col. 11, line 39 to col. 12, line 27.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the fluoropolymer of Jariwala et al. into the fiber of Raether, Kahlbaugh et al. '399, and Gallucci '474 to provide oil and water repellency to the fibers, as suggested by Jariwala et al. in col. 12, lines 7-27.

22. Claims 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Emig et al.

With regard to claims 35 and 36, Raether, Kahlbaugh et al. '399, and Gallucci '474 do not disclose the condensation polymer comprising a polyurethane polymer or a blend of a polyurethane polymer and a polyamide polymer.

Emig et al. teaches forming microfibers from polyurethane and a blend of polyurethane and polyamide in col. 2, lines 59-65.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the polyurethane and blend of polyurethane and polyamide of Emig et al. for the polymers of Raether, Kahlbaugh et al. '399, and Gallucci '474 in that such are alternate polymers in the art for forming fine fibers, mere

substitution of one known fine fiber forming polymer for another in the art being within the scope of one having ordinary skill in the art.

With regard to claims 37 and 38, Kahlbaugh et al. '399 discloses the polyamide polymer comprising a nylon homopolymer or a copolymer of nylon and aromatic nylon in col. 16, lines 56-64.

23. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Idemura et al.

Kahlbaugh et al. discloses the condensation polymer comprising an aromatic polyamide in col. 16, lines 56-64.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not disclose the condensation polymer being a reaction product of a diamine monomer and poly(m-phenylene isophthalamide).

Idemura et al. discloses forming fibers from an aromatic polyamide formed as a reaction product of a diamine monomer and poly(m-phenylene isophthalamide) in col. 7, lines 11-24.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the aromatic polyamide formed as a reaction product of a diamine monomer and poly(m-phenylene isophthalamide) of Idemura et al. into the

fibers of Raether, Kahlbaugh et al. '399, and Gallucci '474 to produce fibers having a very high heat resistance, as suggested by Idemura et al. in col. 7, lines 11-24.

24. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Muto et al.

Kahlbaugh et al. discloses the condensation polymer comprising an aromatic polyamide in col. 16, lines 56-64.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not disclose the condensation polymer being a reaction product of a diamine monomer and poly(p-phenylene terephthalamide).

Muto et al. discloses forming fibers from an aromatic polyamide formed as a reaction product of a diamine monomer and poly(p-phenylene terephthalamide) in col. 7, lines 11-24.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the aromatic polyamide formed as a reaction product of a diamine monomer and poly(m-phenylene isophthalamide) of Idemura et al. for the aromatic polyamides of Raether, Kahlbaugh et al. '399, and Gallucci '474 in that such are alternate aromatic polyamides in the art for forming fibers, mere substitution of one known fiber forming aromatic polyamide for another in the art without a showing of unobvious or unexpected results being within the scope of one having ordinary skill in the art.

25. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Dzenis et al.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not disclose the condensation polymer comprising polybenzimidazole.

Dzenis et al. discloses forming fine fibers from polybenzimidazole in col. 12, lines 36-38.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the polybenzimidazole of Dzenis et al. for the condensation polymers of Raether, Kahlbaugh et al. '399, and Gallucci '474 in that such are alternate polymers in the art for forming fibers, mere substitution of one known fine fiber forming polymer for another in the art without a showing of unobvious or unexpected results being within the scope of one having ordinary skill in the art.

26. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, and Gallucci '474, as applied to claim 14 above and further in view of Ueda et al. '376.

Raether, Kahlbaugh et al. '399, and Gallucci '474 do not disclose the condensation polymer comprising a polyarylate.

Ueda et al. discloses forming fibers from polyarylate in col. 12, lines 36-38.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the polyarylate of Ueda et al. '376 for the condensation polymers of Raether, Kahlbaugh et al. '399, and Gallucci '474 in that such are alternate polymers in the art for forming fibers, mere substitution of one known fine fiber forming polymer for another in the art without a showing of unobvious or unexpected results being within the scope of one having ordinary skill in the art.

27. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether, Kahlbaugh et al. '399, Gallucci '474, and Ueda et al. '376 as applied to claim 43 above and further in view of Okamoto et al. '707

Raether, Kahlbaugh et al. '399, Gallucci '474, and Ueda et al. '376 do not disclose the polyarylate polymer comprising a condensation polymerization reaction product between bis-phenol-A and mixed phthalic acids.

Okamoto et al. '707 discloses forming a polyarylate polymer as a reaction product between bis-phenol-A and mixed phthalic acids in col. 1, lines 34-38.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the polyarylate of Okamoto et al. '352 into the fiber of Raether, Kahlbaugh et al. '399, Gallucci '474, and Ueda et al. '376 to provide a fiber having excellent heat resistance, as suggested by Okamoto et al. in col. 1, lines 34-38.

28. Claims 50-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raether in view of Kahlbaugh et al. '399.

With regard to claim 50, Raether discloses a method for filtering air comprising directing the air through an inlet (11) of a housing (10) and into a filtering chamber (22), the housing including a spacer wall (28) separating the filtering chamber from a clean air chamber (60), the spacer wall including a first air flow aperture therein, after directing the air into the filtering chamber, directing the air through an extension of a pleated filter media composite of a first filter construction (32) and into a filter construction inner clean air chamber, the first filter construction being positioned in air flow communication with the first air flow aperture in the spacer wall, the extension of a pleated filter media composite defining the filter construction inner clean air chamber, the first filter construction being oriented with the filter inner clean air chamber in air flow communication with the spacer wall first air flow aperture, and after directing the air through an extension of a pleated filter media composite of a first filter construction and into a filter construction inner clean air chamber, directing the air into the clean air chamber and out (12) of the housing in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 18.

Raether does not disclose the air having a temperature of at least 140 ^{0}F or the pleated filter media composite including a substrate at least partially covered by a layer of fine fiber, said fiber comprising a diameter of about 0.01 to 0.5 microns that after exposure for a test period of 16 hours to test conditions of 140 ^{0}F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes.

Kahlbaugh et al. '399 discloses a similar filter assembly having a filter media comprising a pleated filter media composite including a substrate (31) at least partially covered by a layer of fine fiber (32), said fiber comprising a diameter of 0.1 microns in Figs. 8-11, col. 14, line 35 to col. 17, line 28, and col. 25, line 5 to col. 27, line 32.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the filter media of Kahlbaugh et al. '399 into the air filter assembly of Raether to provide an improved filter media having a longer lifetime at a given efficiency and flow rate, as suggested by Kahlbaugh et al. '399 in col. 1, line 3 to col. 3, line 35 and col. 9, line 15 to col. 11, line 28.

Since the prior art is seen as disclosing a specific example lying within the claimed range of the fine fiber comprising a diameter of about 0.01 to 0.5 microns, this limitation is anticipated.

With regard to the thermal and humidity resistance of the fine fibers, both Applicants and Kahlbaugh et al '399 disclose forming the fine fiber layer of the same materials. Specifically, Applicants teach forming the fine fiber layer from polyolefin, polyvinyl chloride (PVC), cellulose ester, polyacrylonitrile, polyamides, polystyrene, polysulfones, polyvinylidene fluoride, polyvinylidene chloride, or nylon in page 12, line 13 to page 13, line 27. Kahlbaugh et al. '399 teaches forming the fine fibers from identical materials in page 16, lines 53-64. Since Applicants and Kahlbaugh et al '399 both teach the fine fiber layer being formed from the same material, the fine fibers of Kahlbaugh et al. '399 would inherently have the same heat and humidity resistance properties as the fine fibers of the present invention.

While Raether and Kahlbaugh et al. '399 do not explicitly disclose the air having a temperature of at least 140 ^{0}F, it would have been obvious to one of ordinary skill in the art at the time the invention was made to operate the method of Raether and Kahlbaugh et al. '399 at a temperature of at least 140 ^{0}F since the media composite is designed to handle such conditions.

With regard to claim 51, Raether discloses the method further including directing a pulse of air (65) into the filter construction inner clear air chamber to at least partially remove particulates collected on the pleated filter media composite in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 52.

With regard to claim 52, Raether discloses the step of directing a pulse of air into the filter construction inner clear air chamber to at least partially remove particulates collected on the pleated filter media composite including directing the pulse of air into a Venturi element (70) mounted to project into the first filter construction inner clean air chamber in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 52.

With regard to claim 53, Raether discloses the housing spacer wall including a plurality of extensions of pleated filter media composites of a plurality of filter constructions (32) wherein each of the extensions of a pleated filter media composites define a respective filter construction inner clean air chamber in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 52.

With regard to claim 54, Raether discloses directing a pulse of air (65) into each of the filter construction inner clear air chambers to at least partially remove particulates collected on each of the pleated filter media composites in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 52.

With regard to claim 55, Raether discloses the step of directing a pulse of air (65) into each of the filter construction inner clear air chambers to at least partially remove particulates collected on each of the pleated filter media composites including directing the pulse of air into a plurality of Venturi elements (70) each mounted to project into a respective filter construction inner clean air chamber in Figs. 1, 2, 7, and 8 and col. 3, line 22 to col. 8, line 52.

29. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raether and Kahlbaugh et al. '399 as applied to claim 50 above, and further in view of Barton.

Raether and Kahlbaugh et al. '399 do not disclose vibrating the media to at least partially remove particulates collected on the pleated filter media composite.

Barton discloses a similar method including vibrating a filter media to at least partially remove particulates collected on the pleated filter media composite in col. 1, line 49 to col. 2, line 54.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the vibration cleaning of Barton in to the method of

Raether and Kahlbaugh et al. '399 to shake loose trapped particulates, as suggested by Barton in col. 1, lines 49-60.

Conclusion

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Zhang, Rousseau et al., Baghaii, and Roth references disclose similar fibers capable of being used to form filter media.

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (703) 308-6240. The examiner can normally be reached on Tuesday - Friday (7:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Simmons can be reached on (703) 308-1972. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jason M. Greene
Examiner
Art Unit 1724

jmg
August 15, 2002

David A. Simmons
Supervisory Patent Examiner
Technology Center 1700